Ordering number: EN 4750



No. 4750

Monolithic Linear IC

LA7286

VCR Audio Signal Recording and Playback Processor

Functions

- Equalizer amplifier
- Line amplifier
- Recording amplifier
- Recording bias current automatic adjustment circuit
- Ripple filter
- Mute
- ALC
- Recording/playback switch
- SP, LP, EP switch
- Tape head switch

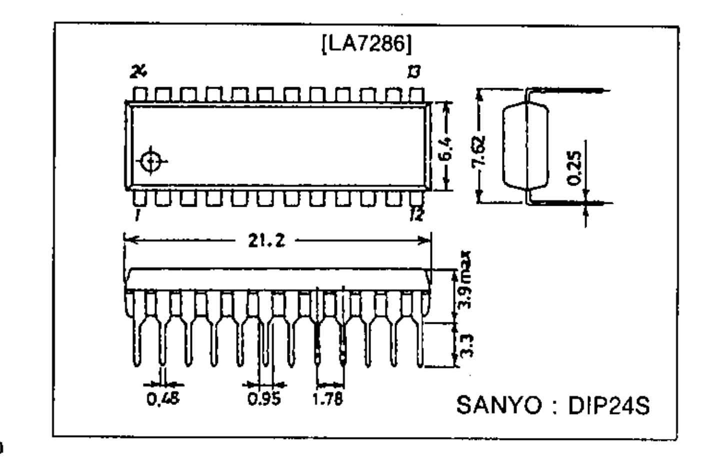
Features

- No adjustment of recording bias current required (due to adoption of automatic adjustment circuit).
- Recording bias oscillation circuit power supply switch on chip.
- Eliminates need for choke coil for recording equalizer.
- Playback amplifier equivalent input noise voltage: 1.0 μVrms.
- Reduced capacitance (3.3 μF) of ALC detection capacitor.
- High withstand voltage head switch on chip.
- Supply voltage: 9 V and 12 V operation.

Package Dimensions

unit : mm

3067-DIP24S



Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC}max$		14	V
Pin 2 input voltages	$V_{IN}2$	DC	±65	Vp-p
Pin 2 input current	$I_{IN}2$		±1.5	mA
Allowable power dissipation	Pdmax	Ta ≤ 65°C	500	mW
Operating temperature	Topr		–10 to +65	°C
Storage temperature	Tstg		–55 to +150	°C

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		9, 12	V
Operating supply voltage range	$V_{CC}op$		8.5 to 12.5	V

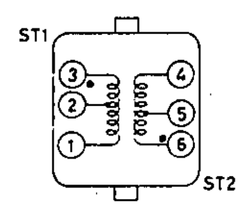
Operating Characteristics at Ta = 25°C, V_{CC} = 12 V, f = 1 kHz, 0 dBV : 1.0 Vrms

Parameter	Symbol	Conditions	min	typ	max	Unit
Current consumption (EE)	I_{CCE}	No signal	9.5	12.0	14.5	mA
Current consumption (PB)	I_{CCP}	No signal	8.5	11.0	13.5	mA
Current consumption (REC)	I_{CCR}	No signal	8.5	10.5	12.5	mA
[Equalizer amplifier]						
Open-circuit voltage gain	VG_{OE}	V_O = –6 dBV	58.4	64.4		dB
Equivalent input noise voltage	V_{NIE}	Rg = 620 Ω, DIN Audio filter		1.0	1.8	μVrms
[Line amplifier]						
Voltage gain (PB input)	VG_{LP}	V_O = –6 dBV	21.0	21.5	22.0	dB
Voltage gain (LINE input)	VG_{LR}	V_O = –6 dBV	21.0	21.5	22.0	dB
Total harmonic distortion	THD_L	V_O = –6 dBV		0.05	0.3	%
Output noise voltage	V_{NOL}	Rg = 1 kΩ, DIN Audio filter		–80.0	–74.0	dBV
Maximum output voltage	V_{OML}	THD = 1%	1.7	2.5		Vrms
Output voltage when ALC is on	V_{OA}	V_{IN} = –26 dBV	–7.0	–6.0	–5.0	dBV
ALC effect	ALC	V_{IN} = –26 dBV to –6 dBV		1	3	dB
Distortion when ALC is on	THD_A	V_{IN} = –26 dBV		0.05	0.6	%
[Recording amplifier]						
Voltage gain	VG_{CR}	V_O = –6 dBV	13.5	14.0	14.5	dB
Total harmonic distortion	THD_R	V_O = –6 dBV		0.05	0.3	%
Maximum output voltage	V_{OMR}	THD = 1%	1.7	2.5		Vrms
[Mute circuit]						
On voltage	V_{MON}	Pin 22 DC voltage	2.5		6.0	V
Off voltage	V_{MOFF}	Pin 22 DC voltage	0		1.5	V
Mute attenuation (PB, EE)	M_P, M_E		80	90		dB
[EP, LP, SP switch circuit]						
EP mode hold voltage	V_{EE}	Pin 21 DC voltage	3.6		6.0	V
LP mode hold voltage	V_{EL}	Pin 21 DC voltage	1.8		2.6	V
SP mode hold voltage	V_{ES}	Pin 21 DC voltage	0		1	V
[EE, PB switch circuit]						
EE mode hold voltage	V_{LL}	Pin 23 DC voltage	3		6	V
PB mode hold voltage	V_{LP}	Pin 23 DC voltage	0		1	V
[REC, EE switch circuit]						
REC mode hold voltage	V_{RR}	Pin 24 DC voltage	3		6	V
EE mode hold voltage	V_{RE}	Pin 24 DC voltage	0		1	V
[Switch]						
Pin 2 on resistance	$R_{ON}2$	I2 = ±1 mA		10	25	Ω
Pin 2 input voltage	$V_{IN}2$	Ta = 65°C, f = 80 kHz (sin), I_{LK} = 10 μA			±45	V
[Recording bias current automatic adjustment circuit]						
Recording bias current	I_B	The conditions for using each head assume the specifications shown below.	220	245	270	μA
Pin 1 output control range	V_{CTL}		2.5	4.0	6.0	V

Head Coil Specifications

(1) Application circuit 1 (erase head series type)

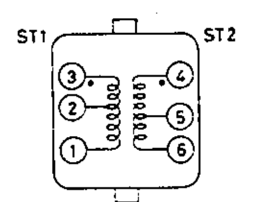
- R/P Head 58 kΩ (typ) +15% –15% (f = 70kHz)
- AE Head 34 Ω (typ) +25% –25% (f = 70kHz)
- FE Head 80 Ω (typ) +20% –10% (f = 70kHz)
- OSC Coil: Model name 7QM3, Prototype No. C-14290, Tokyo Parts Ind. Co., Ltd. Tel = 0270-25-1191



Pin No.	3 to 2	2 to 1	6 to 5	5 to 4
Wire type	2UEW 0.09	←	←	←
Total number of coils	32T	20T	180T	25T

(2) Application circuit 2 (erase head parallel type)

- R/P Head 58 kΩ (typ) +10% −20% (f = 70kH$_z$)
- AE Head 180 Ω (typ) +25% −5% (f = 70kH$_z$)
- FE Head 80 Ω (typ) +20% −20% (f = 70kH$_z$)
- OSC Coil:Model name 7QM3, Prototype No. C-14284, Tokyo Parts Ind. Co., Ltd.



Pin No.	3 to 2	2 to 1	4 to 5	5 to 6
Wire type	2UEW 0.10	←	←	←
Total number of coils	15T	25T	110T	30T

* The head specifications are as agreed upon by Alps Electric and Sanyo.

Block Diagram

24 REC/EE, 23 EE/PB, 22 MUTE, 21 EP/LP/SP, 20 RIPPLE FILTER, 19 VCC, 18 AUTO REC BIAS FILTER, 17 AUTO REC BIAS IN, 16 EQ SW2, 15 REC AMP OUT, 14 REC AMP IN, 13 LINE AMP OUT

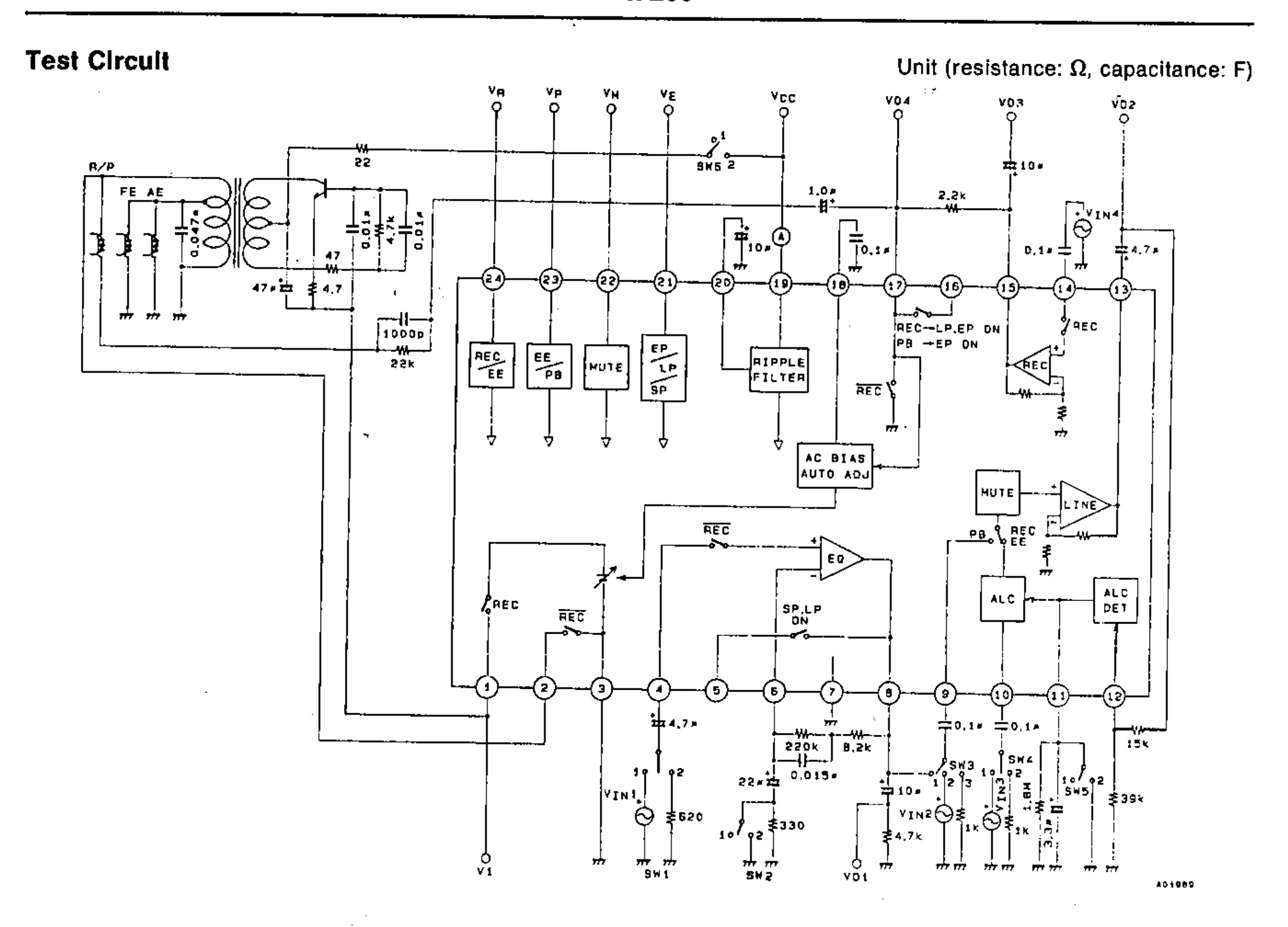
REC/EE
EE/PB
MUTE
EP/LP/SP
RIPPLE FILTER
REC→LP.EP ON
PB →EP ON
REC
REC
AC BIAS AUTO ADJ
MUTE
LINE
PB
REC
EE
REC
EQ
REC
REC
SP.LP ON
ALC
ALC DET

1 AUTO REC BIAS OUT, 2 HEAD SW, 3 GND, 4 EQ AMP IN, 5 EQ SW1, 6 EQ AMP NFB, 7 GND, 8 EQ AMP OUT, 9 PB IN, 10 LINE IN, 11 ALC FILTER, 12 ALC DET IN

A01988

Test Circuit

Unit (resistance: Ω, capacitance: F)

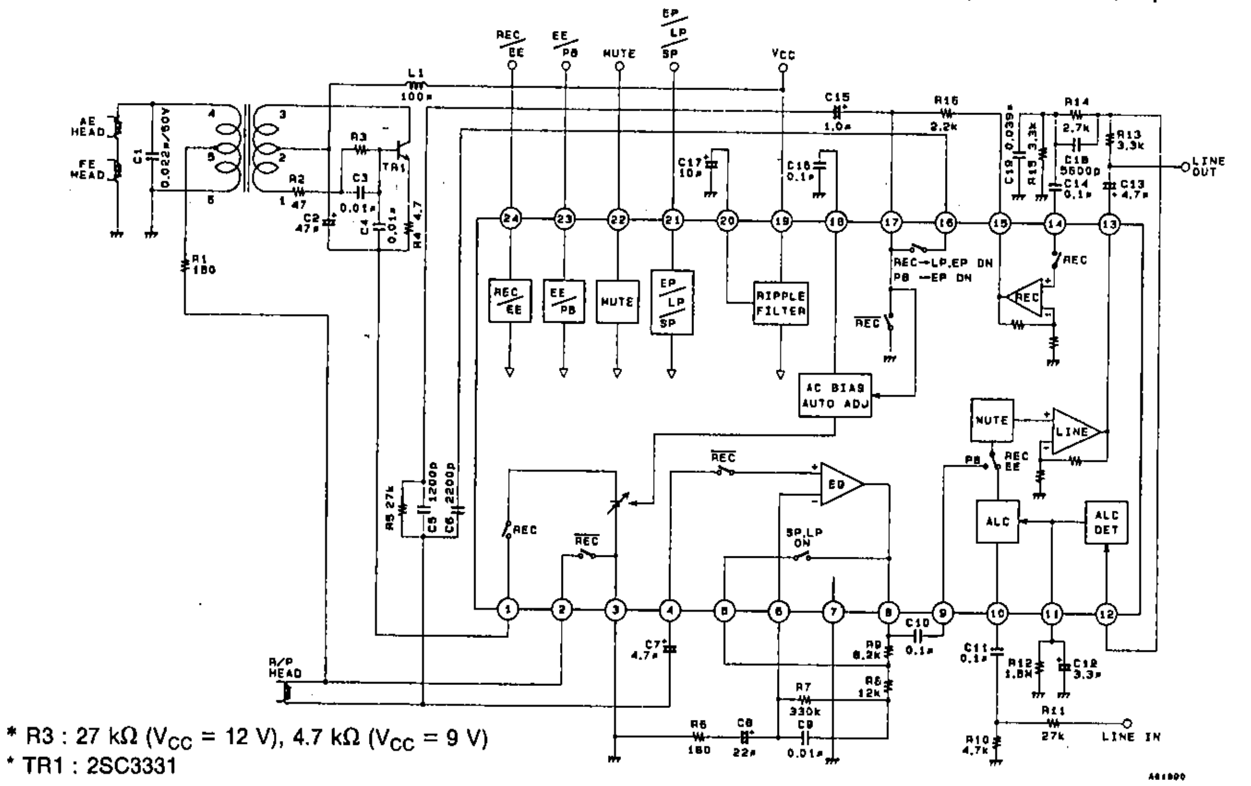


Switch Operation Table

Test item (symbol)	SW1	SW2	SW3	SW4	SW5	SW6	V_M	V_P	V_R	Input	Measure
I_{CCE}	2	1	3	2	2	1	GND	5 V	GND	—	I_O
I_{CCP}	2	1	3	2	2	1	GND	GND	GND	—	I_O
I_{CCR}	2	1	3	2	2	1	GND	5 V	5 V	—	I_O
VG_{OE}	1	2	3	2	2	1	GND	GND	GND	$V_{IN}1$	V_O1
V_{INE}	2	1	3	2	2	1	GND	GND	GND	—	V_O1
VG_{LP}, THD_L, V_{MOL}	2	1	2	2	2	1	GND	GND	GND	$V_{IN}2$	V_O2
VG_{LR}	2	1	3	1	2	1	GND	5 V	GND	$V_{IN}3$	V_O2
V_{ONL}	2	1	3	2	2	1	GND	5 V	GND	—	V_O2
V_{OA}, ALC, THD_A	2	1	3	1	1	1	GND	5 V	GND	$V_{IN}3$	V_O2
VG_R, THD_R, V_{MOR}	2	1	3	2	2	1	GND	5 V	5 V	$V_{IN}4$	V_O3
M_P	1	1	1	2	2	1	5 V	GND	GND	$V_{IN}1$	V_O2
M_E	2	1	3	1	2	1	5 V	5 V	GND	$V_{IN}3$	V_O2
V_{BIAS}	2	1	3	2	2	2	GND	5 V	5 V	—	V_O4
V_{CTL}	2	1	3	2	2	2	GND	5 V	5 V	—	V1

Sample Application Circuit : Erase head series type

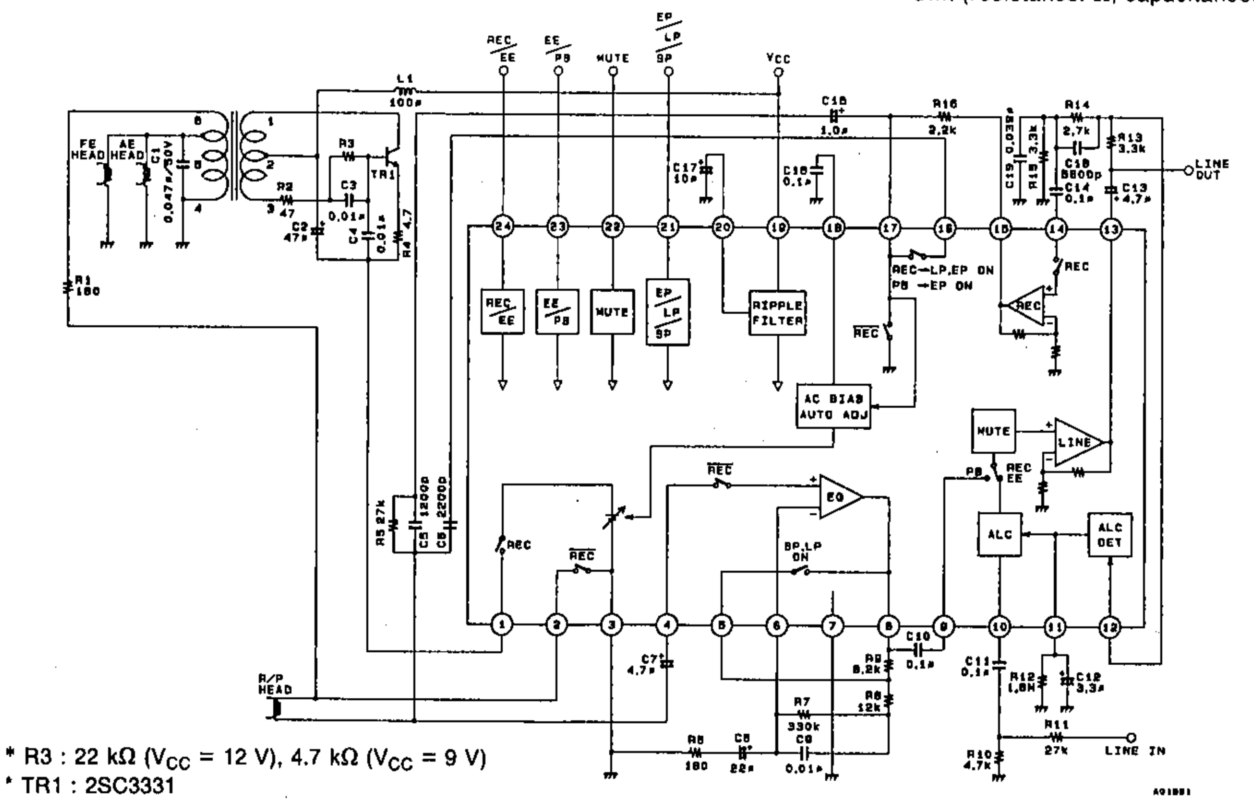
Unit (resistance: Ω, capacitance: F)



* R3 : 27 kΩ (V_{CC} = 12 V), 4.7 kΩ (V_{CC} = 9 V)
* TR1 : 2SC3331

Sample Application Circuit : Erase head parallel type

Unit (resistance: Ω, capacitance: F)



* R3 : 22 kΩ (V_{CC} = 12 V), 4.7 kΩ (V_{CC} = 9 V)
* TR1 : 2SC3331

Pin Functions

Unit (resistance: Ω)

Pin No.	Function name	Internal circuit for pin	Description of function
1	Recording bias automatic control output	A01992	EE, PB → off REC → control voltage
2	Head switch (high withstand voltage)		EE, PB → on REC → off On resistance →10 Ω (typ) Withstand voltage when off → ±45 V (f = 80 kHz)
3	GND		GND for pin 2 head switch and Equalizer Amplifier only
4	EQ AMP input	A01993	Input impedance for playback signal input from head → 120 kΩ (typ)
5	EQ switch 1	A01994	Switches the Playback Equalizer Amplifier high-region frequency voltage gain. LP, SP → on EP → off On resistance → 20 Ω (typ)
6	EQ AMP NFB	A01995	Equalizer Amplifier negative feedback pin
7	GND		GND for all circuit blocks except the pin 2 head switch and Equalizer Amplifier

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Unit (resistance: Ω)

Pin No.	Function name	Internal circuit for pin	Description of function
8	EQ AMP output		Output impedance → 50Ω (typ)
9	LINE AMP PB input		Inputs the playback signal from the Equalizer Amplifier. Because the input impedance is as high as 120 kΩ, a 0.1 μF ceramic capacitor can be used for the coupling capacitor on pin 9.
10	LINE AMP LINE input		Inputs EE and REC signals. The reference input is set by resistors R1 and R2. The amplifier gain is fixed at 21.5 dB. In addition, because the input impedance is as high as 120 kΩ, a 0.1 μF ceramic capacitor can be used for the coupling capacitor on pin 10.
11	ALC FILTER		Wave detection is performed when connected to GND through a capacitor. In addition, the attack and recovery time is set by the C and R time constants.
12	ALC input wave detection		Inputs the Line Amplifier output signal. The ALC level is set by the resistors R1 and R2.

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Unit (resistance: Ω)

Pin No.	Function name	Internal circuit for pin	Description of function
13	LINE AMP output	A02003	Output inpedance → 50 Ω (typ)
14	REC AMP input	VREF 120k 14 A02004	Inputs the recording signal from Line Amplifier. R1 R2 14 A02C05 The recording current is set by the resistors R1 and R2. In addition, because the input impedance is as high as 120 kΩ, a 0.1 μF ceramic capacitor can be used for the coupling capacitor on pin 14.
15	REC AMP output	A02005	Output impedance → 50 Ω (typ)
16	EQ switch 2	16 17 A02007	Switches the high-region peaking frequency during recording and playback. (table: rows EP / LP / SP; columns REC, PB) EP: On, On; LP: On, Off; SP: Off, Off On resistance → 30 Ω (typ)
17	Recording bias automatic control input and PB switch.	17 IB VREF A02008	EE, PB → on REC → off On resistance → 20 Ω (typ)

	REC	PB
EP	On	On
LP	On	Off
SP	Off	Off

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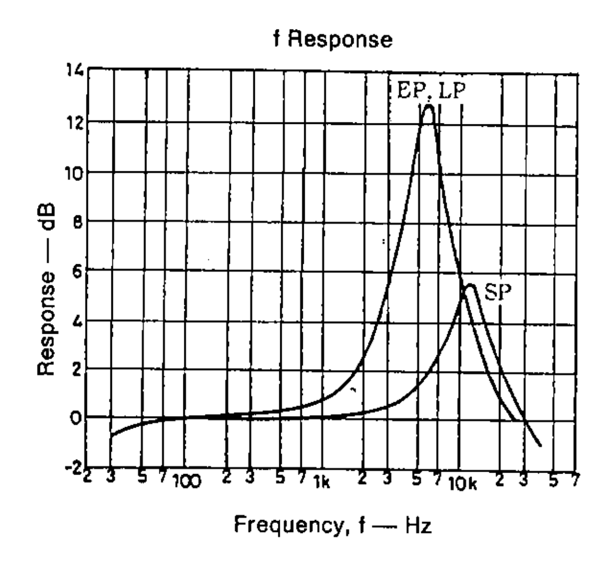
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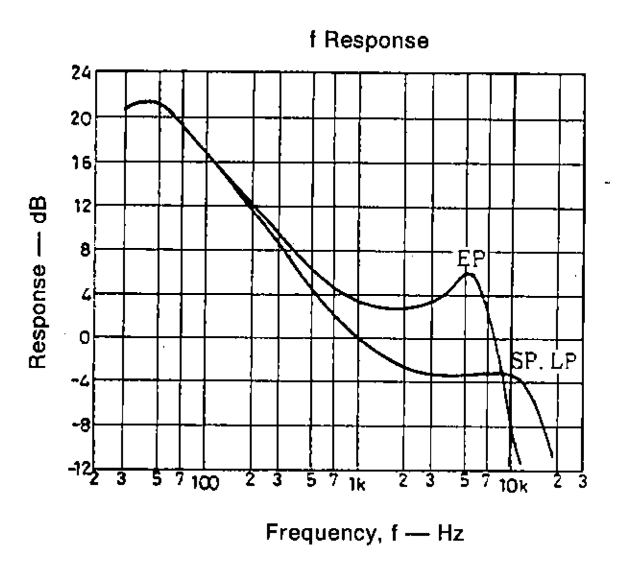
Unit (resistance: Ω)

Pin No.	Function name	Internal circuit for pin	Description of function
18	Recording bias automatic control filter		Wave detection is performed when connected to GND through a capacitor.
19	Supply voltage (V_{CC})		V_{CC} max = 14 V V_{CC} = 8.5 V to 12.5 V
20	Ripple filter		Ripple rejection is performed when connected to GND through an electrolytic capacitor for the filter.
21	EP/LP/SP Control		When the voltage on pin 21 is 3.6 V to 6.0 V: EP; when 1.8 V to 2.6 V: LP; when 0 V to 1.0 V: SP Switch On Pin Number (see table below)
22	MUTE Control		When the voltage on pin 22 is 2.5 V to 6.0 V: MUTE on; when 0 V to 1.5 V: MUTE off
23	EE/PB Control		When the voltage on pin 23 is 3.0 V to 6.0 V: EE; when 0 V to 1.0 V: PB
24	REC/EE Control		When the voltage on pin 24 is 3.0 V to 6.0 V: REC; when 0V to 1.0 V: EE However, REC mode is entered only when the voltage on pin 23 is 3.0 V to 6.0 V.

Switch On Pin Number (pin 21):

	REC	PB
EP	16	16
LP	16, 5	5
SP	5	5





This catalog provides information as of May, 1995. Specifications and information herein are subject to change without notice.